WHAT IS CLAIMED IS:

1. A method of filling a gap defined by adjacent raised features on a substrate, comprising:

providing a flow of a silicon-containing processing gas to a chamber housing the substrate;

providing a flow of an oxidizing gas to the chamber;

depositing a first portion of a film as a substantially conformal layer in the gap by causing a reaction between the silicon-containing processing gas and the oxidizing gas, wherein depositing the conformal layer comprises varying over time a ratio of the (silicon-containing processing gas):(oxidizing gas) and regulating the chamber to a pressure in a range from about 200 torr to about 760 torr throughout deposition of the conformal layer;

thereafter, depositing a second portion of the film as a bulk layer, wherein depositing a second portion of the film comprises maintaining the ratio of the (silicon-containing processing gas):(oxidizing gas) substantially constant throughout deposition of the bulk layer and regulating the chamber to a pressure in a range from about 200 torr to about 760 torr throughout deposition of the bulk layer; and

thereafter, exposing the substrate to nitrous oxide at a temperature less than about 900°C to anneal the deposited film.

2. The method of claim 1, wherein exposing the substrate to nitrous oxide at a temperature less than about 900°C to anneal the deposited film comprises exposing the substrate to nitrous oxide at a temperature less than about 750°C to anneal the deposited film.

3. The method of claim 1, further comprising thereafter planarizing the film.

4. The method of claim 3, wherein planarizing the film comprises subjecting the film to chemical mechanical polishing.

5. A method of forming isolation structures in a silicon substrate, comprising:

etching trenches in the substrate;

providing a flow of a silicon-containing processing gas to a chamber housing the substrate;

providing a flow of an oxidizing gas to the chamber;

causing a reaction between the silicon-containing processing gas and the oxidizing processing gas to form a silicon oxide layer;

heating the substrate in the presence of nitrous oxide; and

thereafter, planarizing the layer.

6. The method of claim 5, wherein planarizing the layer comprises subjecting the layer to chemical mechanical polishing.

7. The method of claim 5, wherein causing a reaction between the silicon-containing processing gas and the oxidizing processing gas to form a silicon oxide layer comprises:

depositing a first portion of a film as a substantially conformal layer in the trenches by causing a reaction between the silicon-containing processing gas and the oxidizing gas, wherein depositing the conformal layer comprises varying over time a ratio of the (silicon-containing processing gas):(oxidizing gas) and regulating the chamber to a pressure in a range from about 200 torr to about 760 torr throughout deposition of the conformal layer; and

thereafter, depositing a second portion of the film as a bulk layer, wherein depositing a second portion of the film comprises maintaining the ratio of the (silicon-containing processing gas):(oxidizing gas) substantially constant throughout deposition of the bulk layer and regulating the chamber to a pressure in a range from about 200 torr to about 760 torr throughout deposition of the bulk layer.

8. The method of claim 7, wherein heating the substrate in the presence of nitrous oxide comprises exposing the substrate to nitrous oxide at a temperature less than about 900°C to anneal the deposited film.

9. A method of forming a silicon oxide layer on a substrate, comprising:

providing a flow of a silicon-containing processing gas to a chamber housing the substrate;

providing a flow of an oxidizing processing gas to the chamber;

causing a reaction between the silicon-containing processing gas and the oxidizing processing gas to form a silicon oxide layer; and

heating the substrate in the presence of nitrous oxide.

10. The method of claim 9, wherein:

providing a flow of a silicon-containing processing gas comprises providing a flow of tetraethylorthosilicate (TEOS); and

providing a flow of an oxidizing processing gas comprises providing a flow of ozone.

11. The method of claim 9, wherein causing a reaction between the silicon-containing processing gas and the oxidizing processing gas comprises regulating the pressure of the chamber to sub-atmospheric levels.

12. The method of claim 11, wherein the sub-atmospheric levels comprise pressures in a range from about 200 torr to less than about 760 torr.

13. The method of claim 9, wherein causing a reaction between the silicon-containing processing gas and the oxidizing processing gas comprises regulating the temperature of the chamber to a range from about 400° C to about 570° C.

14. The method of claim 9, wherein heating the substrate in the presence of nitrous oxide comprises heating the substrate to a temperature in a range from about 750° C to about 1000° C in a furnace.

15. The method of claim 15, wherein heating the substrate in the presence of nitrous oxide further comprises introducing steam into the furnace.

16. The method of claim 9, wherein heating the substrate in the presence of nitrous oxide comprises heating the substrate to a temperature greater than or equal to 1000° C in a rapid thermal process for a duration greater than or equal to 1 minute.

17. A method of forming a silicon oxide layer on a substrate, comprising:

providing a flow of a silicon-containing processing gas to a chamber housing the substrate;

providing a flow of ozone to the chamber;

causing a reaction between the silicon-containing processing gas and the ozone to form a silicon oxide layer; and

heating the substrate in the presence of nitrous oxide in a furnace to a temperature in the range from about 750° C to about 1000° C.

18. The method of claim 17, further comprising introducing steam into the furnace.

19. The method of claim 17, wherein the silicon-containing processing gas comprises tetraethylorthosilicate (TEOS).

20. A method of forming a silicon oxide layer on a substrate, comprising:

providing a flow of tetraethylorthosilicate (TEOS) processing gas to a chamber housing the substrate;

providing a flow of ozone to the chamber;

regulating the pressure of the chamber to a pressure in a range from about 200 torr to less than about 760 torr;

causing a reaction between the TEOS and the ozone to form a silicon oxide layer; and

heating the substrate in the presence of nitrous oxide.

21. The method of claim 20, wherein heating the substrate in the presence of nitrous oxide comprises heating the substrate in the presence of nitrous oxide in a furnace to a temperature in the range from about 750° C to about 1000° C.

22. The method of claim 20, wherein heating the substrate in the presence of nitrous oxide comprises heating the substrate to a temperature greater than or equal to 1000° C in a rapid thermal process for a duration greater than or equal to 1 minute.

23. A method of forming a silicon oxide layer on a substrate, comprising:

providing a flow of tetraethylorthosilicate (TEOS) processing gas to a chamber housing the substrate;

providing a flow of ozone to the chamber;

regulating the pressure of the chamber to a pressure in the range from about 200 torr to less than about 760 torr;

causing a reaction between the TEOS and the ozone to form a silicon oxide layer; and

heating the substrate in the presence of nitrous oxide in a furnace to a temperature in the range from about 750° C to about 1000° C.